

Notice of Allowability

Application No.

09/620,162

Examiner

Wesley D. Markham

Applicant(s)

BAUM ET AL.

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to applicant's amendment of 2/17/05 and the attached examiner's amendment.
2. ☒ The allowed claim(s) is/are 1-5, 7-17, 19, 21 and 28-31.
3. ☒ The drawings filed on 20 July 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>attached</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

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EXAMINER'S AMENDMENT / ALLOWANCE

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ms. Marianne Fuierer on 4/8/2005.

The application has been amended as follows:

In the specification:

Before the first line of the specification, the continuity data has been amended to read

--This is a division of U.S. Application No. 08/825,480, filed on March 28, 1997, now U.S. Patent No. 6,117,571.--

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In the claims:

The following listing of the claims will replace all prior versions and listings of the claims.

1. (Previously presented) A method of forming a doped A-site deficient manganate material on a substrate from corresponding precursor(s), comprising liquid delivery and flash vaporization thereof to yield a precursor vapor, transporting the precursor vapor to a chemical vapor deposition reactor for chemical vapor deposition formation of the manganate material on the substrate, said manganate material having the formula $\text{La}_x\text{M}_y\text{MnO}_3$, where $\text{M} = \text{Mg, Ca, Sr, or Ba}$, and $0.5 < (x+y) < 0.9$, and annealing the manganate material in an oxygen atmosphere for a sufficient time period to increase the Curie temperature of the manganate material in a range from 17 °C to about 50 °C.
2. (Previously presented) The method according to claim 1, wherein the precursor(s) comprise coordination compounds, or Lewis base complexes of metal(s) selected from the group consisting of lanthanum, magnesium, calcium, strontium, barium, and manganese.
3. (Previously presented) The method according to claim 1, wherein the precursor(s) include metal β -diketonate compounds, metal pivalate compounds, or Lewis base complexes thereof.

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4. (Previously presented) The method according to claim 1, wherein the precursor(s) include metal fluorinated β -diketonate compounds, or Lewis base complexes thereof.
5. (Previously presented) The method according to claim 1, wherein the precursor(s) include metal pivalate Lewis base adducts.
6. (Cancelled)
7. (Previously presented) The method according to claim 1, wherein the precursor(s) are dissolved in a solvent and flash vaporized at a temperature of from about 100 °C to about 300 °C.
8. (Previously presented) The method according to claim 1, wherein the precursor vapor is transported to the chemical vapor deposition reactor in a carrier gas.
9. (Previously presented) The method according to claim 8, wherein the carrier gas is selected from the group consisting of argon, nitrogen, neon, helium and ammonia.
10. (Previously presented) The method according to claim 8, wherein the carrier gas is mixed with an oxidizing co-reactant gas in the chemical vapor deposition reactor or prior to transport to the chemical vapor deposition reactor.

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11. (Previously presented) The method according to claim 1, wherein the chemical vapor deposition reactor contains a substrate article heated to a temperature in the range of from about 300 °C to about 1000 °C.

12. (Previously presented) The method according to claim 11, wherein the pressure of the precursor vapor in the chemical vapor deposition reactor is from about 0.1 to about 760 Torr.

13. (Previously presented) The method according to claim 1, wherein the chemical vapor deposition is plasma-assisted.

14. (Previously presented) The method according to claim 1, wherein the precursor(s) comprise a mixture of β -diketonate compounds selected from the group consisting of $\text{La}(\text{thd})_3$, $\text{Ca}(\text{thd})_2$ and $\text{Mn}(\text{thd})_3$.

15. (Previously presented) The method according to claim 1, wherein the precursor(s) comprise a mixture of β -diketonate compounds selected from the group consisting of $\text{La}(\text{thd})_3$, $\text{Sr}(\text{thd})_2$ and $\text{Mn}(\text{thd})_3$.

16. (Previously presented) The method according to claim 14, wherein said precursor(s) comprise a mixture of Lewis base adducts of metal β -diketonate precursors.

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17. (Previously presented) The method according to claim 1, wherein M is Ca and said manganate material has A-site deficient stoichiometry, where $(La+Ca) < 0.9$.

18. (Cancelled)

19. (Previously presented) The method according to claim 1, wherein M is Sr and said manganate material has A-site deficient stoichiometry, where $(La+Sr) < 0.9$.

20. (Cancelled)

21. (Previously presented) The method according to claim 1, wherein M is Ba and said manganate material has A-site deficient stoichiometry, where $(La+Ba) < 0.9$.

22 – 27. (Cancelled)

28. (Currently amended) The method according to claim 1, wherein a deposited film of the manganate material that exhibits a relatively high transition temperature before annealing displays a smaller increase in the Curie temperature upon annealing than a deposited film of the manganate material that exhibits a relatively low transition temperature before annealing ~~the deposited films exhibiting a high transition temperature before annealing displays a smaller increase in the Curie temperature upon annealing.~~

29. (Previously presented) The method according to claim 17, having a (La+Ca):Mn ratio that is between 0.6 and 0.9.

30. (Previously presented) The method according to claim 17, having a Ca/La ratio that is between 0.35 and 0.55.

31. (Previously presented) The method according to claim 1, wherein the manganate material has a ratio of (x+y):Mn from 0.6 to 0.9.

Allowable Subject Matter

Claims 1 – 5, 7 – 17, 19, 21, and 28 – 31 are allowed.

The following is an examiner's statement of reasons for allowance: Independent Claim 1 (from which Claims 2 – 5, 7 – 17, 19, 21, and 28 – 31 depend) is drawn to a method of forming a doped A-site deficient manganate material on a substrate by liquid delivery / flash vaporization CVD. The method comprises forming the manganate material on a substrate in a CVD reactor, the manganate material having A-site deficient stoichiometry and a formula of $\text{La}_x\text{M}_y\text{MnO}_3$, where M = Mg, Ca, Sr, or Ba, and $0.5 < (x+y) < 0.9$, and annealing the manganate material in an oxygen atmosphere for a sufficient time period to increase the Curie temperature of the manganate material in a range from 17 °C to about 50 °C. A summary of the closest prior art of record follows. Jin et al. (USPN 5,461,308) teaches forming a manganate material having a wide

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variety of chemical formulas on a substrate by a technique such as CVD, and Li et al. (USPN 5,487,356) teaches forming a manganate material that is not A-site deficient (e.g., has a chemical formula of $(La_{1-x}A_x)MnO_3$) by liquid delivery / flash vaporization CVD. Additionally, Li et al. generally teaches annealing the non-A-site deficient manganate material in oxygen. However, the prior art of record, alone or in combination, does not teach or reasonably suggest producing the claimed A-site deficient manganate material by liquid delivery / flash vaporization CVD in combination with annealing the material in an oxygen atmosphere for a period of time sufficient to increase the Curie temperature of the material in the range claimed by the applicant (i.e., 17 °C to about 50 °C). As such, independent Claim 1 is allowed. Claims 2 – 5, 7 – 17, 19, 21, and 28 – 31 depend from Claim 1 and are therefore also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

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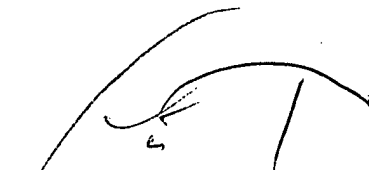
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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Examiner
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TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER